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Prescription Practices involving Opioid Analgesics among Americans with Medicaid, 2010

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CDC [KM, KZ, LP] and the FDA [CJ]

Abstract

Recent state-based studies have shown an increased risk of opioid overdose death in Medicaid populations. To explore one side of risk, this study examines indicators of potential opioid inappropriate use or prescribing among Medicaid enrollees. We examined claims from enrollees aged 18–64 years in the 2010 Truven Health MarketScan® Multi-State Medicaid database, which consisted of weighted and nationally representative data from 12 states. Pharmaceutical claims were used to identify enrollees (n=359,368) with opioid prescriptions. Indicators of potential inappropriate use or prescribing included overlapping opioid prescriptions, overlapping opioid and benzodiazepine prescriptions, long acting/extended release opioids for acute pain, and high daily doses. In 2010, Medicaid enrollees with opioid prescriptions obtained an average 6.3 opioid prescriptions, and 40% had at least one indicator of potential inappropriate use or prescribing. These indicators have been linked to opioid-related adverse health outcomes, and methods exist to detect and deter inappropriate use and prescribing of opioids.

Keywords

Medicaid; opioids; prescription drugs; overdose

The problem of overdose from prescription medications has emerged as a major public health issue in the United States.[1] In 2013, drug overdoses killed 43,982 Americans, more than the number killed in motor vehicle traffic crashes. Opioid analgesics alone or in combination with benzodiazepines or other drugs account for nearly half of all drug overdose deaths.[2] Misuse or abuse of pharmaceuticals also led to more than 1.4 million emergency departments (ED) visits—with over 420,000 involving opioid analgesics in 2011.[3]

Studies using administrative data from a limited number of health plans have described opioid use generally (such as number of opioid prescriptions received, average daily dose, and total days' supply,) and/or potential opioid misuse (such as high daily dosage, overlapping opioids, and overlapping opioids and benzodiazepines).[4–7] Other studies and

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government reports have focused on opioid use and misuse specifically among the Medicaid population.[8–10] This population is of concern because it has, on average, higher levels of mental health and substance abuse disorders than the general population[9,11] and thus potentially greater risk for adverse outcomes with opioids. Indeed, two states have reported an increased risk of opioid overdose death in their Medicaid populations.[12,13]

This study expands the literature in this area by examining multiple indicators of use and potential misuse of opioids among Medicaid patients using one of the largest fully-integrated health insurance claims databases in the United States. The objective is to describe the volume of opioid prescribing among Medicaid enrollees, and provide an index of measures to describe potential misuse or inappropriate prescribing.

Methods

Data source

We conducted secondary data analyses of the Truven Health MarketScan® Multi-State Medicaid database, which consisted of weighted and nationally representative data from 12 geographically dispersed states. The MarketScan Medicaid database contains standardized, fully integrated, enrollee-level de-identified claims across inpatient, outpatient, and prescription drug services for both fee-for-services and capitation plans. Our analysis primarily drew data from pharmaceutical claims in 2010 for filled prescriptions, which included outpatient drug name, therapeutic class, national drug code, days of supply, and quantity for about 1.38 million Medicaid enrollees aged 18–64 years. In addition, the outpatient service claims and inpatient admission records were used to identify the underlying pain diagnoses related to opioid use. Inpatient admission records were employed only to identify the diagnoses associated with opioid prescriptions prescribed to enrollees at discharge. Drugs administered during hospitalizations were not included. No personal identifying information was available in the database, and this study did not require human subjects' review.

Study population

From the pharmaceutical claims we identified 3,534,564 opioid prescriptions for the 1.38 million enrollees aged 18–64 years (Figure 1). We excluded 704,624 opioid prescriptions for non-continuously enrolled Medicaid recipients in 2010; 173,125 opioid prescriptions that lacked the dispensing information necessary for the calculation of outcome indicators; and 67,073 opioid prescriptions that were refill prescriptions that could not be linked to their original diagnoses. We also excluded 68,642 opioid prescriptions for enrollees under institutional long-term-care, and 218,678 for enrollees with a cancer diagnosis in their outpatient or inpatient service claims. Cancer diagnosis were based on International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes including 338.3; 140–172.9; 174–215.9; 217–229.10; and 235–239.9. Finally, roughly 1% (37,405) of the opioid prescriptions were for buprenorphine products and were excluded due to their primary use for the treatment of opioid dependence (methadone received at narcotic treatment centers is excluded by default given that we did not capture narcotic treatment center claims). This selection process resulted in 2,265,017 opioid prescriptions for 359,368

Medicaid enrollees as our final study population (see Figure 1). A list of opioids analyzed is available upon request, and morphine equivalent conversion factors used have been previously described.[14]

Subpopulation with identified diagnoses—To calculate a subset of outcome indicators that are specific to certain types of pain, we linked opioid prescription claims to the diagnoses on outpatient or inpatient service claims by matching enrollee ID and the date of service in these claims. Consistent with the existing literature,[15] we linked opioid prescriptions to the outpatient services or inpatient discharges that occurred within 14 days of the prescription dispense dates. If multiple outpatient or inpatient records existed within this interval, we linked to the one that occurred on the day closest to the drug dispense dates. When inpatient and outpatient dates of service overlapped, we used the outpatient claims for the linkage. Prescription refills were assigned the diagnoses on the original prescriptions. We successfully linked 1,772,632 (78.3%) of the 2,265,017 opioid prescriptions to diagnoses for 323,879 enrollees (90% of the overall study population). Of the remaining 21.7% of prescriptions, 19.5% could not be linked because the outpatient services or inpatient discharges had occurred more than 14 days prior to the prescription dispensing date or in 2009; 2.2% could not be linked because MarketScan did not have the enrollee's outpatient service claims.

Outcome indicators

We adapted outcome indicators that had been identified by expert panels and clinical guidelines[16–22] and validated by their association with abuse of overdose.[23–26] These indicators captured both general opioid use as well as potential misuse by patients or inappropriate prescription practices by providers.

At the enrollee level, indicators of general opioid use included the total number of opioid prescriptions, total days' supply of opioids, and medical diagnoses (such as acute pain, other pain, or both) associated with opioid prescriptions. Acute pain and other pain diagnoses were based on ICD-9-CM codes (Table 1 footnote b and c). Indicators of potential misuse or inappropriate prescription practices consisted of: (1) opioid overlap, defined as opioid prescriptions that overlap seven or more days (including early refills); (2) opioid and benzodiazepine overlap, defined as opioid and benzodiazepine prescriptions that overlap seven or more days; (3) high daily opioid dose, defined as a prescribed daily dose of 100 morphine milligram equivalents (MMEs) or greater; and (4) rapid opioid dose escalation, measured as having a 50% or greater increase in mean MMEs per month twice consecutively during the year.

Three indicators specific to long-acting/extended-release (LA/ER) prescriptions were examined given their elevated risk for addiction and initiation abuse: (1) LA/ER opioid prescriptions written for acute pain conditions; (2) overlapping LA/ER opioid prescriptions; and (3) LA/ER prescriptions obtained by an opioid “naïve” person, defined as a person who had no prescription for an opioid for at least 60 days prior to that for an LA/ER opioid.

At the prescription level, indicators of general opioid use included the number of days' supply and the prescribed daily doses for opioid prescriptions for acute, back, and other

pain. Back pain included both acute and other back pain and was based on ICD-9-CM codes recommended by the American College of Occupational and Environmental Medicine (ACOEM) practice guidelines.[27] Indicators of potential inappropriate prescription practices are the same as those described for enrollees though expressed in number of prescriptions.

Statistical analysis

We calculated the distributions of various levels of usage among all enrollees receiving an opioid prescription overall, by sex, and by pain type. The prevalence for indicators of potential misuse by patients or inappropriate prescription practices by providers was calculated as both a percentage of enrollees and a percentage of prescriptions. We used t-tests or chi-square tests for comparisons by sex.

Results

Enrollee-level indicators

In the overall study population of Medicaid enrollees with at least one opioid prescription (opioid recipients), 74% were female. The mean age of opioid recipients was 41.4 years among males and 36.9 years among females (Table 1). Males received on average one more opioid prescription than females (males mean = 7.1; females 6.0). More than half of all opioid recipients had three or more opioid prescriptions (53%) in 2010. Notably, 7% of the study population had 20 or more opioid prescriptions during the data year—with more than 800 enrollees receiving 50 or more opioid prescriptions (data not shown).

Just under one half of the male recipients (49.4%) received less than 30 total days' supply of opioids, and about 37.1% received more than 90 days' supply of opioids in 2010. Among women, nearly 60% received less than a 30 days' supply, and 27.1% received more than 90 days' supply of opioids during 2010. Over 13,000 (14%) male opioid recipients received 200–364 days of opioids in the past year, and 11,326 (12%) received more than a 365 days' supply. For women nearly 27,000 (10%) received 200–364 days, and 21,269 (8%) received more than 365 days (data not shown).

We were able to identify the associated medical diagnoses for opioid prescriptions for 90% of the overall study population; 22% of the recipients obtained opioids for acute pain conditions only; 17.7% received opioids for other pain conditions only; and 29.7% obtained opioids for both acute and other pain conditions. Another 20.6% of the recipients received opioid prescriptions for diagnoses not included in the lists of acute or other pain conditions (e.g., acute pharyngitis, chronic airway obstruction, unspecified dental caries, urinary tract infection, and other general symptoms)

The most common indicator of inappropriate use was having an opioid/b enzodiazepine overlap (Table 2); 22.6% of the opioid recipients had at least one such event during the study period. Seventeen percent of the study population had daily doses of 100 MMEs or higher per opioid prescription at least once during the study period, and of those recipients, 17% had daily doses of 100 MMEs or higher for more than 90 days (data not shown). Roughly 1% of the opioid recipients had opioid dose escalation. Overall 40.7% of the opioid recipients had at least one indicator of inappropriate use: one-quarter (24.7%) had one

indicator, 11% had two and 5% had three. Among those who had LA/ER opioid prescriptions, 21.8% received LA/ER opioids for an acute pain condition at least once.

Prescription level indicators

Among the 1,772,632 prescriptions that were linked to diagnoses, about 16.5% of them were written for acute pain conditions alone, and a higher proportion (34.9%) were for other pain alone. Ten percent were associated with both acute pain and other pain conditions, and 15.3% were associated with back pain diagnoses. The remaining 38.5% of the prescriptions were linked to diagnoses not included in the lists of acute or other pain conditions (as noted above).

The mean days' supply for acute, other, and back pain was nine, 20, and 21 days, respectively (Table 3). For acute pain, 70.6% of prescriptions were written for nine or fewer days, and 14% were written for 30 or more days. The mean daily opioid dose for prescriptions for acute pain was higher for men (53.1 MME) than females (49 MME). Notably, 9% of prescriptions for acute pain were written for 100 MME per day or more.

For other pain, nearly half (48.4%) of the prescriptions were for 30 or more days. The mean daily dose for opioid prescriptions for other pain was higher for males (62 MME) than females (52.6 MME). While other pain conditions were treated for longer periods of time than acute pain conditions, the average dosage employed was comparable to that used for acute pain. For back pain, over half of the prescriptions were for 30 days or more. The mean daily dose for back pain was similar to that for other pain at 61.8 MME for males and 51.8 MME for females.

As for indicators of potential inappropriate prescribing, roughly 30% of opioid prescriptions overlapped with other opioid prescriptions, and 30.9% overlapped with a benzodiazepine prescription. Among LA/ER opioid prescriptions, a quarter overlapped with other LA/ER opioid prescriptions; 5.4% were written for acute pain conditions; and 3.4% were obtained by opioid-naïve patients.

Discussion

In 2010, more than 2.2 million opioid prescriptions were written for 359,368 adults without cancer diagnoses who were continuously enrolled in Medicaid programs in 12 states. Most patients obtained a single opioid prescription without also obtaining prescriptions for benzodiazepines or muscle relaxants. Nearly 60% of recipients had opioid prescriptions written for less than 30 days. However, signs of potential opioid misuse by patients or inappropriate prescribing by providers were evident among this study population. One quarter of patients had one indicator of potential misuse of opioids and 16% (or over approximately 57,000 patients) had two or more indicators of potential inappropriate use. These numbers are substantially higher than a recent analysis examining similar indicators among privately insured patients, where 19.2% of patients had one indicator of potential inappropriate misuse or prescribing practices and 5.8% had two or more indictors.[14] In general, this is consistent with findings from previous studies examining opioid use among Medicaid patients compared with privately insured patients.[7]

It is important to note that most of the prescriptions for opioids appeared to fall within the range of appropriate use and standard care. Nevertheless, there is cause for concern. The opioid misuse indicators examined in this study have been linked to opioid-related adverse health outcomes in other studies. Increased numbers of opioid prescriptions, overlapping or early refill prescriptions, dose escalation, and greater days' supply of opioids have all been associated with increased risk of clinically recognized abuse.[23,24] Higher daily dose has been associated with misuse, emergency department visits, and overdoses.[24–26] Acute pain is not an indication for an LA/ER opioid, and such use is considered inappropriate by clinical guidelines[19] and yet in this study, 21.8% of those who received a LA/ER opioid, did so for acute pain. Further, most LA/ER opioids carry warnings against initiation among opioid-naïve patients.

The New York City Department of Health and Mental Hygiene has recommended no more than a seven-day supply of opioids for acute pain,[28] however, in this study 15.3% of opioid prescriptions for acute pain were prescribed for 10–29 days, and 14% were for 30 or more days. For severe, acute low back pain specifically, the American College of Occupational and Environmental Medicine practice guidelines only recommend opioids on a limited basis, with treatment to last no more than two weeks.[27] Opioids are not recommended to be used for long-term treatment of chronic back pain.[29] In this study, over half (51.7%) of opioid prescriptions for back pain were written for 30–49 days, more than recommended by expert consensus.

While women make up 58% of the total Medicaid population, they were 74% of our study population. Our study is consistent with previous literature in finding that women constitute the majority of users of opioids both alone and in combination with benzodiazepines.[15] We found that the mean number of opioid prescriptions differed by one script per year between female and male opioid recipients (6.0 and 7.1 respectively); however, the annual mean days' supply was much lower for women than men (96.4 and 133 respectively). Despite the fact that men are more likely to use prescription painkillers non-medically, to abuse opioids, and to die from drug overdoses involving opioids,[30,31] the percentage increase in the number of recent deaths from prescription painkillers is greater among women.[32] The prevalences of indicators of possible misuse in this study were only slightly lower among women in this Medicaid population.

Limitations

Our study has several limitations. The potential inappropriate indicators have been validated by their association with misuse or abuse in other studies. In some cases, of course, such behaviors represent appropriate care for patients not misusing drugs, e.g., overlapping prescriptions resulting from changes in dosage or in drug type as a result of some adverse effect, or use of short-acting opioids for break through pain in patients receiving long-acting or extended release opioids. Claims data were designed to support financial transactions rather than to capture clinical information, and as such may suffer some inherent flaws, however they remain an important source of health data.[33] Pharmacy claims represent filled prescriptions reimbursed rather than actual drug consumption and do not capture prescriptions paid for with cash. Prescriber information was incomplete to the extent that

analyses based on prescriber data would have severe limitations. Last, relying on ICD-9CM codes to determine the reason for a prescription is subject to error. Many conditions are painful but are not usually counted among common causes of pain. Type of pain might also have been misclassified. While these analyses are unable to determine whether patient or prescriber was the source of any potential prescribing or use problems, our analysis represents a comprehensive look at opioid use and potential inappropriate among Medicaid recipients in the largest fully-integrated commercial claims database in the United States, and they point to situations that warrant further investigation to determine causal factors.

While the majority of opioid prescriptions among this population might have been appropriate, a substantial number were prescribed in a manner that suggests inappropriate patient use or provider prescribing practice. Robust prescription opioid utilization review programs using integrated claims data, similar to our analyses, might reduce misuse and overdose risk, help improve quality of care, and reduce unnecessary health care costs.[6,34] Such programs, combined with other systematic prevention strategies such as prescription drug monitoring programs, that track information on controlled substance prescriptions filled in a state, and use of opioid prescribing guidelines may assist providers to address improper opioid use, reduce the risk of adverse outcomes, and improve the appropriate prescribing of opioid medications.

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Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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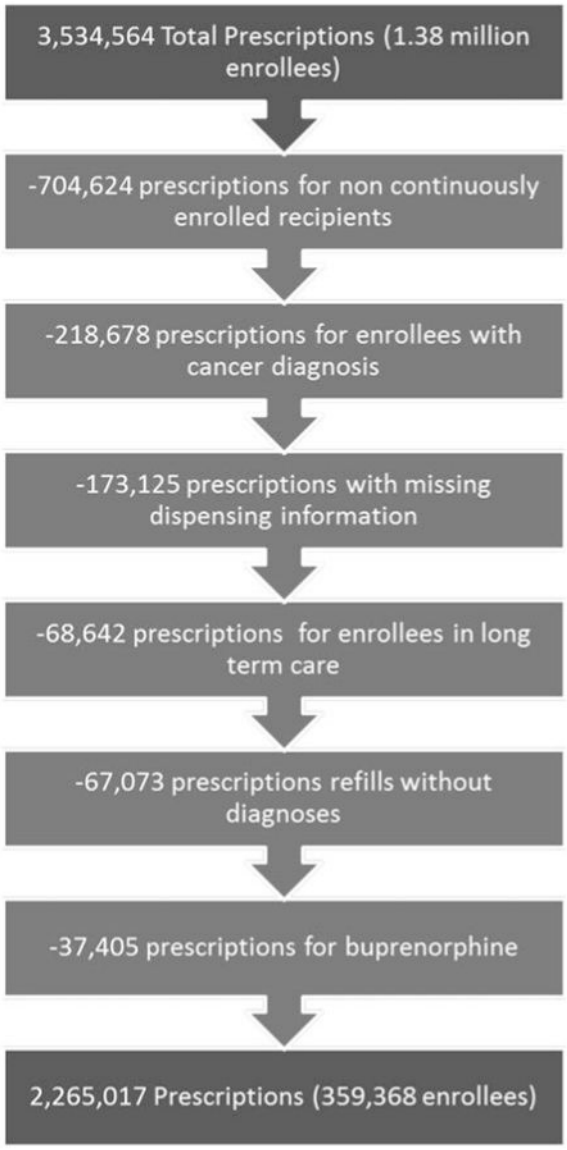

Figure 1.
Opioid prescriptions drawn from pharmaceutical claims flow chart.

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Table 1

Demographic Characteristics and General Opioid Use Indicators Among Medicaid Enrollees Prescribed Opioid Analgesics, Marketscan 2010

	Males (n=94,278)		Females (n=265,090)		Total (n=359,368)	
Characteristic	**n**	**%**	**n**	**%**	**n**	**%**
Age, years						
18–34	31,520	33.4%	133,252	50.3%	164,772	45.9%
35–44	16,945	18.0%	48,238	18.2%	65,183	18.1%
45–54	25,777	27.3%	46,863	17.7%	72,640	20.2%
55–64	20,036	21.3%	36,737	13.9%	56,773	15.8%
Mean*		41.4 years		36.9 years		38.1 years
Medication use						
No. of opioid prescriptions obtained						
1	28,065	29.8%	85,266	32.2%	113,331	31.5%
2	12,835	13.6%	42,719	16.1%	55,554	15.5%
3 or more	53,378	56.6%	137,105	51.7%	190,483	53.0%
Mean*		7.1		6.0		6.3
Combinations of drugs obtained in 2010[a]						
Opioid & benzodiazepine*	26,554	28.2%	81,244	30.6%	107,798	30.0%
Opioid & muscle relaxant*	30,656	32.5%	89,263	33.7%	119,919	33.4%
Opioid, benzodiazepine, & muscle relaxant*	11,946	12.7%	41,494	15.7%	53,440	14.9%
Total days' supply for opioids						
<30	46,543	49.4%	158,502	59.8%	205,045	57.1%
30–59	8,270	8.8%	23,134	8.7%	31,404	8.7%
60–89	4,528	4.8%	11,579	4.4%	16,107	4.5%
Days' supply con't						
90+	34,937	37.1%	71,875	27.1%	106,812	29.7%
Median		30		15		17
Mean morphine mg equivalent dose		46.3		44.1		44.7
Diagnoses associated with opioid drugs						

	Males (n=94,278)		Females (n=265,090)		Total (n=359,368)	
Characteristic	**n**	**%**	**n**	**%**	**n**	**%**
Acute pain only*[b]	18,722	19.9%	60,722	22.9%	79,444	22.1%
Other pain only*[c]	18,178	19.3%	45,354	17.1%	63,532	17.7%
Acute and other pain*[d]	29,000	30.8%	77,794	29.3%	106,794	29.7%
Other diagnoses*	16,619	17.6%	57,461	21.7%	74,080	20.6%
Unknown[e]	11,759	12.5%	23,759	9.0%	35,518	9.9%

*Difference between males and females is significant p<.01

[a]For this indicator, “combinations of drugs obtained in 2010,” drugs were not necessarily prescribed together in a single visit or in a similar time period. For example, an enrollee in the first category might have obtained an opioid prescription in January of 2010 and a benzodiazepine prescription in December of 2010. Indicators that assess drug overlap are listed in table 3.

[b]Acute pain was determined by whether the enrollee had a diagnosis of a disease or an injury or a surgical procedure that could cause acute pain. Diagnoses for acutely painful diseases and injuries and their ICD9-CM codes were: sickle cell with crisis (282.62); acute pain (338.11,338.12,338.18,338.19); dental abscess with sinus (522.5); dental abscess without sinus (522.7); gallstone (574); acute pancreatitis (577); kidney stone (592); pathological fracture (733.1); acute injury (800–904.9); other acute injury (910–959.9); external cause of injury codes (E800–E849.9; E880–E909.9; E916–E928.9; E953–E968.9; E970–E976.9; E983–E999.9). After the exclusion of minor procedures, surgical procedures included: excision of breast tissue; other major skin, breast, or musculoskeletal surgeries; other major respiratory, cardiovascular, hemic and lymphatic, digestive, eye/ocular, ear/auditory or urinary procedures; repair of inguinal hernia procedures; major male genital procedures; dilation and currettage; major female genital procedures; decompression, carpal tunnel surgery; major endocrine system, and nervous system procedures; cataract removal; other major surgery procedures; cesarean section deliveries; major maternity procedures and related care; and dental, or major restorative surgery.

[c]Diagnoses likely to be associated with other pain and their ICD9-CM codes included: chronic pain (338.21, 338.22, 338.28, 338.29, 338.4); migraine headache (346.0–346.9); tension headache (307.81); arthritis or joint pain (710.0–719.9); dorsopathies, or back pain (720.0–724.9); and arthritis or joint pain (725.0–729.9)

[d]Enrollees listed as having acute and chronic pain conditions associated with opioid drugs included those who had both types of pain diagnoses listed in a single opioid related office visit as well as those who had separate opioid related visits for each type of pain.

[e]Causes for opioid use were unknown because these enrollees' opioid prescriptions could not be linked to any outpatient/inpatient service claims.

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Table 2

Indicators of Potential Inappropriate Use Among Medicaid Enrollees Prescribed Opioid Analgesics By Gender, Marketscan 2010

	Males (n=94,278)		Females (n=265,090)		Total (n=359,368)	
	n	%	n	%	n	%
Indicators of Potential Inappropriate Use						
Any opioid overlap[a]						
None	71,840	76.2%	216,728	81.8%	288,568	80.3%
Once*	6,657	7.1%	15,919	6.0%	22,576	6.3%
Two or more incidents*	15,781	16.7%	32,443	12.2%	48,224	13.4%
Opioid/benzodiazepine overlap[b]						
None	73,345	77.8%	204,838	77.3%	278,183	77.4%
Once	3,539	3.8%	10,623	4.0%	14,162	3.9%
Two or more incidents	17,394	18.4%	49,629	18.7%	67,023	18.7%
High daily opioid dose[c]						
None	77,928	82.7%	219,086	82.6%	297,014	82.6%
Once*	6,928	7.3%	26,494	10.0%	33,422	9.3%
Two or more incidents*	9,422	10.0%	19,510	7.4%	28,932	8.1%
Opioid rapid dose escalation[d]						
Any escalation	1,013	1.1%	3,118	1.2%	4,131	1.1%
Indicators						
No indication of inappropriate use	54,627	57.9%	158,391	59.7%	213,018	59.3%
One type of indicator of inappropriate use	23,057	24.5%	65,965	24.9%	89,022	24.7%
2 different indicators of inappropriate use*	10,946	11.6%	28,406	10.7%	39,352	11.0%
≥3 different indicators of inappropriate use*	5,648	6.0%	12,328	4.7%	17,976	5.0%
Long acting/extended release opioids for acute pain conditions[e]						
None	7,804	77.8%	13,004	78.4%	20,808	78.2%
Once	1,289	12.9%	2,229	13.4%	3,518	13.2%
Two or more incidents	934	9.3%	1,351	8.1%	2,285	8.6%
Long acting/extended release opioids that overlap with other long acting/extended release opioids						

	Males (n=94,278)		Females (n=265,090)		Total (n=359,368)	
	n	%	n	%	n	%
None	7,183	71.6%	12,166	73.4%	19,349	72.7%
Once	1,163	11.6%	1,885	11.2%	3,018	11.3%
Two or more incidents*	1,681	16.8%	2,563	15.4%	4,244	16.0%
Long acting/extended release opioids prescribed for opioid naive persons						
Any such incidents	2,562	25.6%	3,945	23.7%	6,507	24.5%

*Difference between males and females is significant p<.01

[a]Days' supply of one opioid prescription overlaps with another opioid prescription for at least 7 days for a given enrollee.

[b]Days' supply of one opioid prescription overlaps with one or more benzodiazepine prescription for at least 7 days for a given enrollee.

[c]≥100 morphine milligram equivalents (MMEs)

[d]Having a 50% or greater increase in mean MME per month twice consecutively during the year.

[e]The numbers of enrollees who received LA/ER opioids were 10,027 and 16,614 for males and females, respectively.

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Table 3

Indicators for General Prescription Practices and Potential Inappropriate Practices for Opioid Analgesics According To Acute, Chronic, or Back Pain Diagnosis, Medicaid Enrollee Prescriptions By Gender, Marketscan 2010

	Prescriptions for Male Enrollees		Prescriptions for Female Enrollees		Total Prescriptions	
Indicator	**N**	**%**	**N**	**%**	**N**	**%**
Indicators of General Prescription Practices						
No. opioid Rx for acute pain[a]	77,022		215,802		292,824	
Days' supply for acute pain diagnosis						
≤9	48,790	63.3%	157,958	73.2%	206,748	70.6%
10–29	13,856	18.0%	31,089	14.4%	44,945	15.3%
30–49	14,351	18.6%	26,722	12.4%	41,073	14.0%
50–69	9	0.0%	25	0.0%	34	0.0%
70–89	0	0.0%	1	0.0%	1	0.0%
≥90	16	0.0%	7	0.0%	23	0.0%
Mean*		11.0		8.8		9.3
Median		5.0		5.0		5.0
Average daily dose for acute pain diagnosis						
Unknown	56	0.1%	129	0.1%	185	0.1%
<40	40,697	52.8%	119,933	55.6%	160,630	54.9%
40–59	14,977	19.4%	42,752	19.8%	57,729	19.7%
60–79	9,586	12.4%	24,333	11.3%	33,919	11.6%
80–99	3,970	5.2%	9,514	4.4%	13,484	4.6%
100–119	1,845	2.4%	6,433	3.0%	8,278	2.8%
Daily dose con't						
120–199	4,005	5.2%	9,236	4.3%	13,241	4.5%
≥200	1,886	2.4%	3,472	1.6%	5,358	1.8%
Mean*		53.1		49.0		50.1
Median		37.5		37.5		37.5
No. opioid Rx for other pain[b]	188,408		430,052		618,460	
Days' supply for other pain diagnosis						

	Prescriptions for Male Enrollees		Prescriptions for Female Enrollees		Total Prescriptions	
Indicator	**N**	**%**	**N**	**%**	**N**	**%**
≤9	38,113	20.2%	116,055	27.0%	154,168	24.9%
10–29	49,898	26.5%	115,207	26.8%	165,105	26.7%
30–49	100,324	53.2%	198,711	46.2%	299,035	48.4%
50–69	41	0.0%	42	0.0%	83	0.0%
70–89	6	0.0%	9	0.0%	15	0.0%
≥90	26	0.0%	28	0.0%	54	0.0%
Mean*		21.6		19.6		20.2
Median		30.0		25.0		28.0
Average daily dose for other pain diagnosis						
Unknown	120	0.1%	247	0.1%	367	0.1%
<40	88,833	47.1%	236,516	55.0%	325,349	52.6%
40–59	35,482	18.8%	75,294	17.5%	110,776	17.9%
60–79	25,554	13.6%	49,153	11.4%	74,707	12.1%
80–99	11,921	6.3%	23,075	5.4%	34,996	5.7%
100–119	1,705	0.9%	4,037	0.9%	5,742	0.9%
120–199	15,364	8.2%	27,830	6.5%	43,194	7.0%
Daily dose con't						
≥200	9,429	5.0%	13,900	3.2%	23,329	3.8%
Mean*		62.2		52.6		55.5
Median		40.0		33.3		37.5
No. opioid Rx for back pain[C]	89,383		181,610		270,993	
Days' supply for back pain diagnosis						
≤9	16,357	18.3%	43,598	24.0%	59,955	22.1%
10–29	22,887	25.6%	47,906	26.4%	70,793	26.1%
30–49	50,109	56.1%	90,079	49.6%	140,188	51.7%
50–69	20	0.0%	13	0.0%	33	0.0%
70–89	3	0.0%	1	0.0%	4	0.0%
>90	7	0.0%	13	0.0%	20	0.0%
Mean*		22.3		20.5		21.1

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	Prescriptions for Male Enrollees		Prescriptions for Female Enrollees		Total Prescriptions	
Indicator	**N**	**%**	**N**	**%**	**N**	**%**
Median		30.0		28.0		30.0
Average daily dose for back pain diagnosis						
Unknown	71	0.1%	107	0.1%	178	0.1%
<40	41,762	46.7%	99,665	54.9%	141,427	52.2%
40–59	17,500	19.6%	33,078	18.2%	50,578	18.7%
60–79	12,132	13.6%	20,920	11.5%	33,052	12.2%
80–99	5,538	6.2%	9,277	5.1%	14,815	5.5%
100–119	707	0.8%	1,550	0.9%	2,257	0.8%
120–199	7,256	8.1%	11,409	6.3%	18,665	6.9%
≥200	4,417	4.9%	5,604	3.1%	10,021	3.7%
Mean*		61.8		51.8		55.1
Median		40.0		33.3		37.5
Indicators of Potential Inappropriate Prescription Practices						
Any opioid overlap*[d]	228,845	34.3%	448,795	28.1%	677,640	29.9%
Any opioid/benzodiazepine overlap*[e]	188,581	28.3%	511,285	32.0%	699,866	30.9%
High daily dose*[f]	90,016	13.5%	166,100	10.4%	256,116	11.3%
Long acting/extended release opioids[g] for acute pain conditions	4,649	5.7%	6,929	5.3%	11,578	5.4%
LA/ER opioids prescribed for opioid naive persons	2,885	3.5%	4,395	3.4%	7,280	3.4%
Long acting/extended release opioids that overlap with other LA/ER opioids	20,873	25.4%	31,441	24.1%	52,314	24.6%

*Difference between males and females is significant p<.01

[a]Acute pain was determined by whether the enrollee had a diagnosis of a disease or an injury or a surgical procedure that could cause acute pain. Diagnoses for acutely painful diseases and injuries and their ICD9-CM codes were: sickle cell with crisis (282.62); acute pain (338.11,338.12,338.18,338.19); dental abscess with sinus (522.5); dental abscess without sinus (522.7); gallstone (574); acute pancreatitis (577); kidney stone (592); pathological fracture (733.1); acute injury (800–904.9); other acute injury (910–959.9); external cause of injury codes (E800–E849.9; E880–E909.9; E916–E928.9; E953–E968.9; E970–E976.9; E983–E999.9). After the exclusion of minor procedures, surgical procedures included: excision of breast tissue; other major skin, breast, or musculoskeletal surgeries; other major respiratory cardiovascular, hemic and lymphatic, digestive, eye/ocular, ear/auditory or urinary procedures; repair of inguinal hernia procedures; major male genital procedures; dilation and currettage; major female genital procedures; decompression, carpal tunnel surgery; major endocrine system, and nervous system procedures; cataract removal; other major surgery procedures; cesarean section deliveries; major maternity procedures and related care; and dental, or major restorative surgery.

[b]Diagnoses likely to be associated with chronic pain and their ICD9-CM codes included: chronic pain (338.21, 338.22, 338.28, 338.29, 338.4); migraine headache (346.0–346.9); tension headache (307.81); arthritis or joint pain (710.0–719.9); dorsopathies, or back pain (720.0–724.9); and arthritis or joint pain (725.0–729.9)

[c] Back pain could be either acute or chronic. ICD9-CM diagnostic codes included 307.89, 721.2, 721.3, 724.2, 724.4, 724.5, 724.6, 724.7, 724.8, 846, 846.0, 846.1, 846.2, 846.3, 846.8, 846.9, 847, 847.2, 847.4, and 847.9.

[d] Days' supply of one opioid prescription overlaps with another opioid prescription for at least 7 days for a given enrollee. The numbers of opioid prescriptions obtained by males and females are 666,265 and 1,598,752 respectively.

[e] Days' supply of one opioid prescription overlaps with one or more benzodiazepine prescription for at least 7 days for a given enrollee.

[f] ≥100 morphine milligram equivalents (MMEs).

[g] The numbers of total LA/ER opioids prescriptions were 82,199 and 130,731 for males and females respectively and percentages are based on those numbers.

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